



Composer User Guide

Version 8.5

JAMF Software, LLC
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Introduction to Composer

A package is a self-contained group of files that can be deployed to remote computers or as part of the imaging process. A package consists of product or component files, such as an application and its required components, a set of fonts, a preference file, or a document. A package also contains instructions about how and where it should be installed once received by the user.

Depending on the files you want to package, Composer allows you to monitor the installation of your software or use files that already exist on your hard drive to create a package source.

You can create a package source using the following methods:

- Taking before and after snapshots of your hard drive
- Monitoring the file system
- Using pre-installed software
- Using user environment settings
- Dragging contents from the Finder into Composer
- Using an existing package

After you verify the contents of a package source, Composer gives you the option to build a PKG or a DMG based on how you intend to use and deploy the package.

Composer also allows you to build a disk image of a pre-configured operating system.

Creating a Package Source

A package source allows you to view and edit attributes of the package (such as files, scripts, permissions, and localizations) before it is built. Once a package source exists for a group of files, you can make modifications and build the package as many times as necessary.

You can create a package source using the following methods:

- **Snapshots**—Composer takes before and after snapshots of your boot partition and creates a package source based on the changes. This method allows you to monitor installations in all locations on the boot drive. If necessary, you can also quit Composer or log out/reboot during the installation process.
- **File system monitoring**—Composer uses the File System Events (FSEvents) framework to monitor any changes that are made to the file system during the installation process. A package source is then created based on the changes. This method does not allow you to quit Composer or log in/reboot during the installation process. In addition, an excess of file system activity can cause FSEvents to miss changes.
- **Using pre-installed software**—Software that is pre-installed on your computer can be used to create a package source based on Composer's package manifests. This method allows you to create package sources without monitoring the installation process.
- **Using user environment settings**—Composer's package manifests can also be used to capture settings configured on your computer, such as Dashboard, Display, and Global Preference settings.
- **Dragging contents from the Finder**—A simple drag-and-drop process allows you to create a package source from files already installed on your computer.
- **Using an existing package**—Composer allows you to make modifications to an existing package or convert between the PKG and DMG package formats.

This section explains how to create package sources using these six methods.

Taking Snapshots

If the files you want to package are not already installed on your hard drive, Composer can take a snapshot of your boot partition before and after the files have been installed and create a package source based on the changes.

Composer can take two kinds of snapshots:

- **Normal snapshots**—These snapshots capture any new files on the boot drive. These snapshots can take anywhere from ten seconds to several minutes depending on your hardware and the number of files on your boot drive.
- **New and modified snapshots**—These snapshots capture any new files on the boot drive, as well as any files that have been modified. These snapshots can take longer than normal snapshots, since Composer records the modifications date of each file while performing the snapshot.

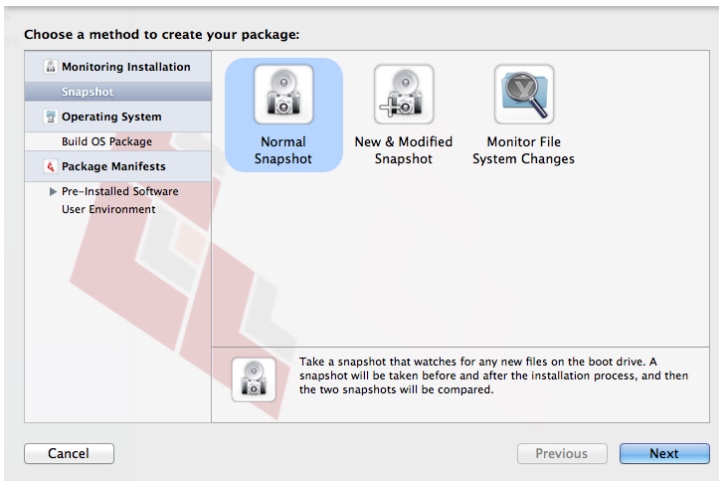
There are several benefits to using the snapshot approach:

- Composer monitors installations in all locations on the boot drive.
- You can quit Composer during the installation process.
- You can log out or reboot during the installation process.

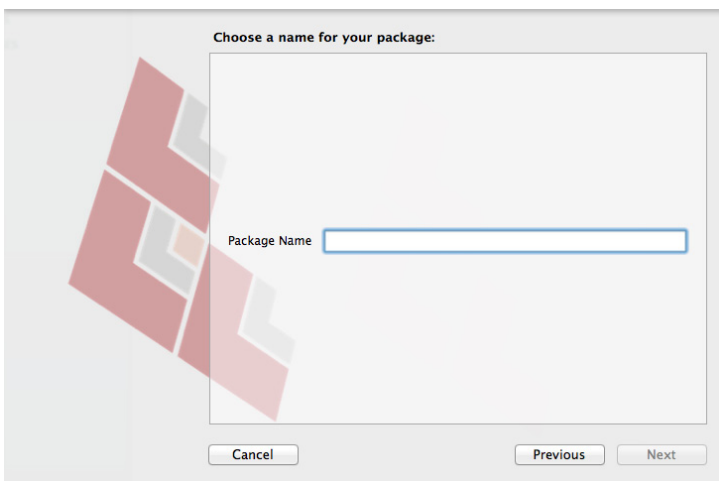
- If you delete a file while making modifications to a package source, it may be possible to restore the deleted file. For more information about restoring deleted files, see the “Editing a Package Source” section.

To create a package source by taking snapshots:

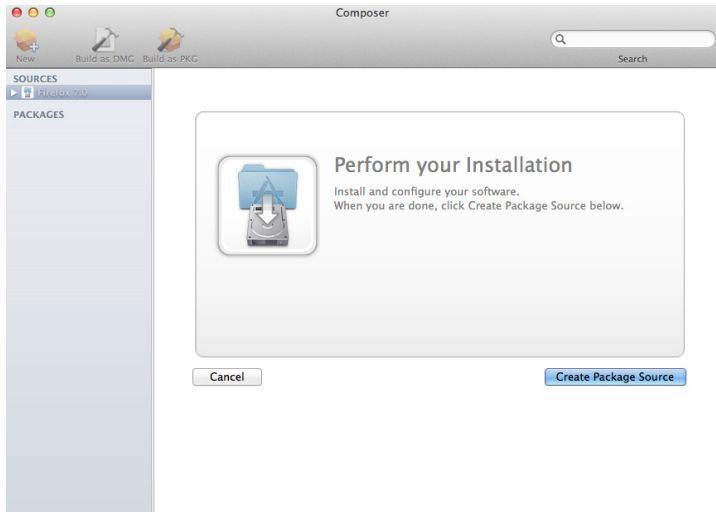
1. Open Composer and authenticate locally.
2. Click the **New** button in the toolbar.
3. Under the Monitor Installation heading in the sidebar, select **Snapshot**.
4. Select **Normal Snapshot** or **New & Modified Snapshot**, and then click **Next**.



5. Enter a name for the package and click **Next**.



6. Install and configure your software, and then click the **Create Package Source** button to initialize the “after” snapshot.



Monitoring the File System

When creating a package source using file system monitoring, Composer uses the File System Events (FSEvents) framework that is built into Mac OS X to monitor any changes that are made to the file system. Each time a change is made, FSEvents receives a notification. After your software is installed, Composer analyzes the changes and creates a package source based on the results.

The following limitations should be taken into consideration when monitoring the file system to create a package source:

- You cannot quit Composer during the installation process.
- You cannot log in or restart during the installation process.
- It is possible for FSEvents to miss events if there is too much file system activity.

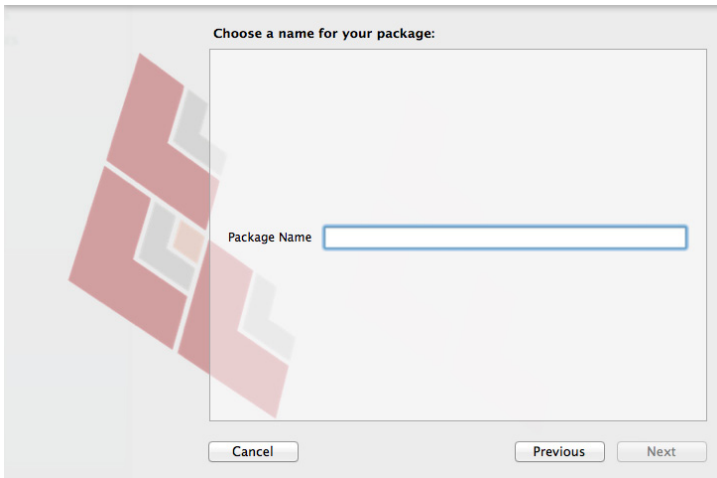
To create a package source by monitoring the file system:

1. Open Composer and authenticate locally.
2. Click the **New** button in the toolbar.
3. Under the Monitor Installation heading in the sidebar, select **Snapshot**.

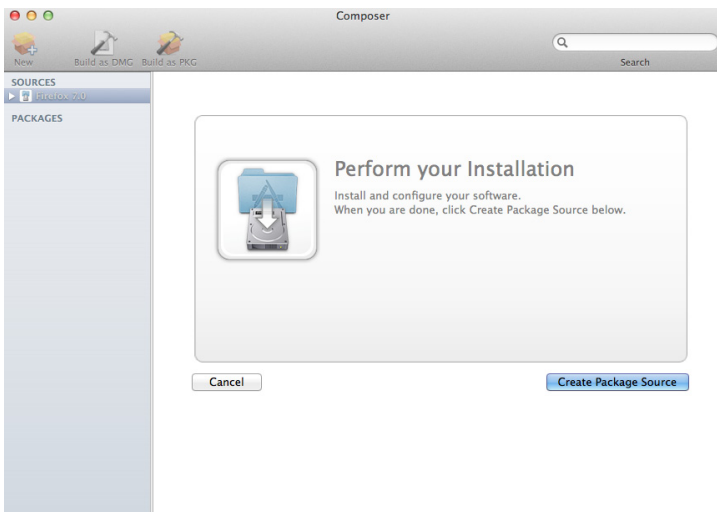
4. Select **Monitor File System Changes** and click **Next**.



5. Enter a name for the package and click **Next**.



6. Install and configure your software, and then click the **Create Package Source** button.



Creating a Package Source from Pre-Installed Software

You can create a package source from software that is currently installed on your computer if Composer contains a package manifest for the software.

Composer comes with package manifests for over 100 different software titles. To determine which pre-installed software Composer can package, select **Pre-Installed Software** under the Package Manifests heading. Composer scans your hard drive and displays icons for the software it can package.

Note: If there is software you would like added to Composer's package manifest options, email your recommendations to diffs@jamfsoftware.com.

To create a package source from pre-installed software:

1. Open Composer and authenticate locally.
2. Click the **New** button in the toolbar.
3. Under the Package Manifests heading in the sidebar, select **Pre-Installed Software**.
4. Select the item(s) you want to create a package source from, and then click **Next**.



Creating a Package Source from User Environment Settings

You can create a package source that captures the look-and-feel of your computer's interface, such as Dashboard, Display, and Global Preference settings. If Composer contains a package manifest for the setting you want to capture, you can create a package source from it.

Composer comes with package manifests for over a dozen different settings. To determine which of your current settings Composer can package, select **User Environment** under the Package Manifests heading. Composer scans your hard drive and displays icons for the settings that it can package.

Note: If there is a setting you would like added to Composer's package manifest options, email your recommendations to diffs@jamfsoftware.com.

To create a package source from user environment settings:

1. Open Composer and authenticate locally.
2. Click the **New** button in the toolbar.
3. Under the Package Manifests heading in the sidebar, select **User Environment**.
4. Select the item(s) you want to create a package source from, and then click **Next**.



Creating a Package Source by Dragging Contents from the Finder

If you already know which item you want to package, you can bypass the snapshot or monitoring process by dragging items from the Finder to the Sources list in Composer.

There are a few ways Composer handles these items:

- If the item is a package file (with a .dmg, .pkg, or .mpkg extension), it is listed in the sidebar under the Packages heading.
- If the item is a folder, the root of the folder is used as the root of the package if it is one of the following directories:
 - /Applications/
 - /Developer/
 - /Library/
 - /System/
 - /Users/
 - /bin/
 - /private/
 - /sbin/
 - /usr/

- Any other items are copied to their current location.

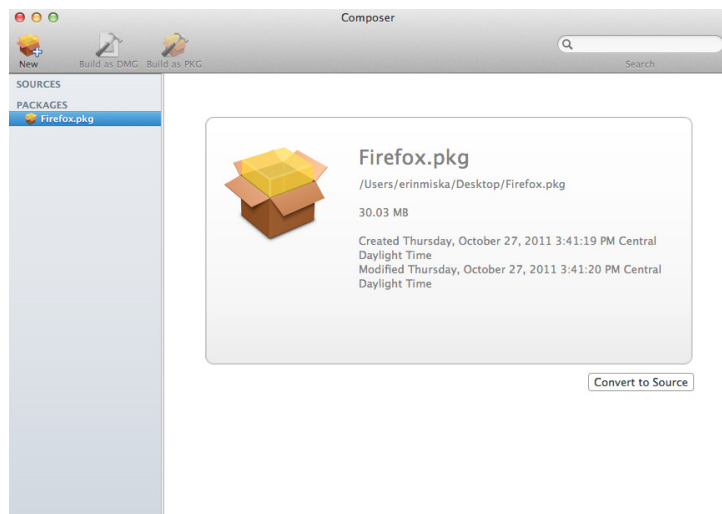
Note: This is the equivalent of a PreBuilt package in earlier versions of Composer.

Creating a Package Source from an Existing Package

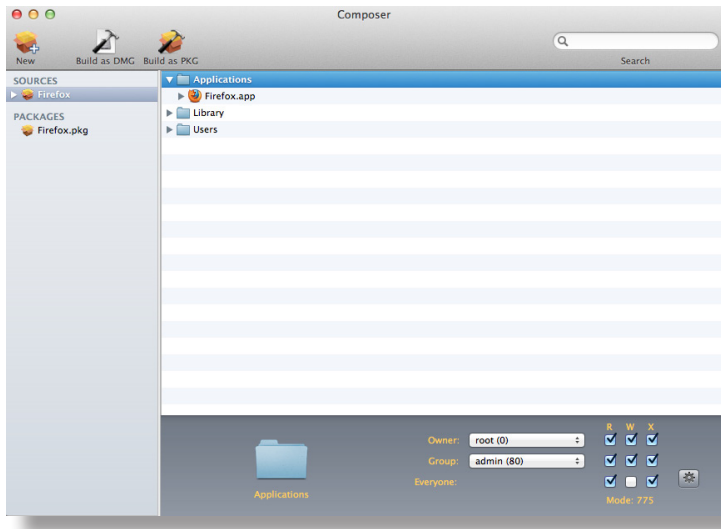
Composer allows you to rebuild an existing package file (.pkg, .dmg, or .mpkg) by converting it to a package source. After converting it to a package source, you can make changes to its contents and save a new copy of the package.

To create a package source from an existing package:

1. Open Composer and authenticate locally.
2. Drag the package you want to convert from the Finder to the sidebar in Composer. The package will appear under the Packages heading.
3. Select the package, and then click the **Convert to Source** button.



4. When the conversion is complete, a new package source is listed in the sidebar under the Sources heading.



Editing a Package Source

If a file is listed in the sidebar under the Sources list in the sidebar, it exists as a package source and can be modified. If a file is not listed in the sidebar under the Sources list, a package source must be created before you can utilize the editing functions described in this section. See “Creating a Package Source” for more information about creating a package source.

Note: Composer does not allow you to create a package source from an OS package.

This section explains how to make the following modifications to a package source:

- View and edit the contents of the package source
- Add scripts
- Edit the `info.plist` and `description.plist` files
- Add localizations

Viewing and Editing the Contents

Once a package source exists for the files you want to package, Composer allows you to edit the contents of the package source in the following ways:

- Delete files that should not be included in the package
- Add files by dragging them into Composer from the Finder
- Modify permissions on a file or folder
- Restore files that were deleted from the package source

In addition to viewing files or folders through Composer’s interface, you can view this information in the Finder or using Quick Look.

Deleting Files or Folders

Select the item(s) you want to delete from your package source in Composer’s Package Contents pane. Choose “Delete” from the Edit menu.

Adding Files

Drag the file(s) you want to add to your package source from the Finder into Composer’s Package Contents pane.

Modifying Permissions on a File or Folder

Select a file or folder in Composer’s Package Contents pane to display its permissions in the bottom of the window. You can change the permissions using this display. Changes are saved automatically. If the selected item is a folder, you can apply the permissions that exist on the folder to each enclosed item by clicking the **Action** button (labeled with the gear icon) to the right of the X-column.

Restoring a Deleted File or Folder

If you delete a file from the Package Contents pane, it may be possible to restore the file. The ability to restore a deleted file depends on the type of snapshot used to create the package source and the location of the file that was deleted. To restore a deleted file, Composer copies the file from its original location on the hard drive.

Note: A file can only be restored if a snapshot was used to create the package source.

To restore a deleted file:

1. Click the disclosure triangle next to the package source in the sidebar.
2. Click the disclosure triangle next to **Snapshots**.
3. Select **Files for Package** to display a list of files, folders, and directories from the snapshot.
4. Select the item you want to restore.
5. Control-click (or right-click) the selected item and choose **Restore**.

Viewing a File or Folder Using the Finder

In the Package Contents pane, select the item(s) you want to preview and choose “Reveal in Finder” from the File menu.

Viewing a File or Folder Using Quick Look

In the Package Contents pane, select the item(s) you want to preview and choose “Quick Look” from the File menu or press the Space bar.

Note: Quick Look is supported by Mac OS X v10.5 or later.

Adding Scripts

Composer allows you to manage scripts for PKGs. The following default scripts are available in shell and perl:

- InstallationCheck
- Postflight
- Postinstall
- Postupgrade
- Preflight
- Preinstall
- Preupgrade
- VolumeCheck

Note: Flat PKGs support `Preinstall` and `Postinstall` scripts only. To build a PKG that contains other scripts, you can deselect the **Build Flat PKGs** option in Composer preferences, or you can disable this preference for a single package. For information on how to disable this preference for a single package, see “Building a PKG”. For more information on flat PKGs, see “Managing Composer Preferences”.

These scripts read in the available parameters that are received from the installer and give descriptions for the supported exit codes.

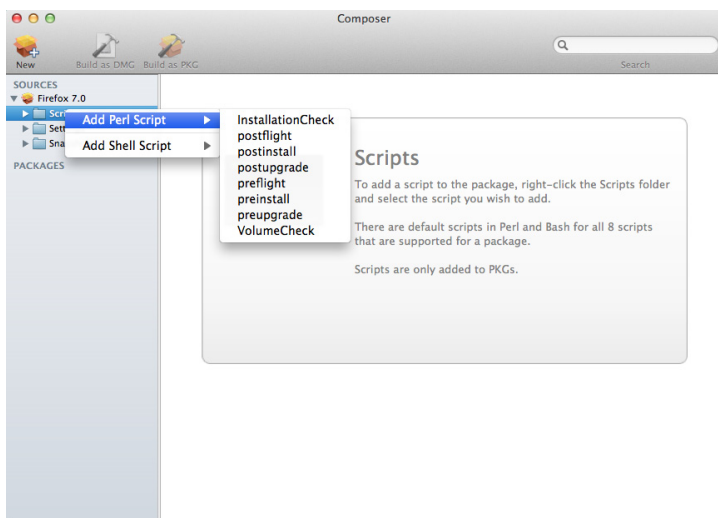
Composer also attempts to verify that the script syntax is valid. If a script appears to have invalid syntax, a warning icon appears.

To view the error that occurred while Composer was verifying the script, Control-click (or right-click) the script and choose **Compile Script**.

Note: `InstallationCheck` and `VolumeCheck` scripts have warning and failure messages that can be localized according to the needs of the user. To localize these messages, the corresponding `.strings` file (`InstallationCheck.strings` or `VolumeCheck.strings`) must be created for each localization.

To add a script to a package source:

1. Click the disclosure triangle next to the package source in the sidebar.
2. Control-click (or right-click) **Scripts** and choose the script you want to add.



The script is displayed under the **Scripts** heading in the sidebar.

3. (Optional) Select the script in the sidebar to view or modify its contents.

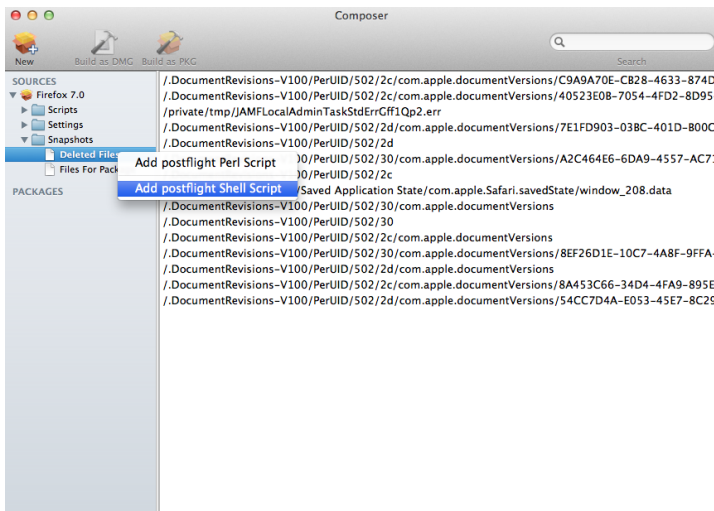
Adding a Postflight Script that Removes Deleted Files from Clients

Adding a postflight script to a package source allows you to remove deprecated or unneeded files from client computers as clients install the package.

Note: This function is only available if a snapshot was used to create the package source.

To add a postflight script that removes deleted files from clients:

1. Click the disclosure triangle next to the package source in the sidebar.
2. Click the disclosure triangle next to **Snapshots**.
3. Select the Deleted Files heading to view the deleted files captured by the snapshot.
4. Control-click (or right-click) the Deleted Files heading and choose **Add postflight Shell Script**.



The script is displayed under the Scripts heading in the sidebar.

5. (Optional) Select the script in the sidebar to view or modify its contents.

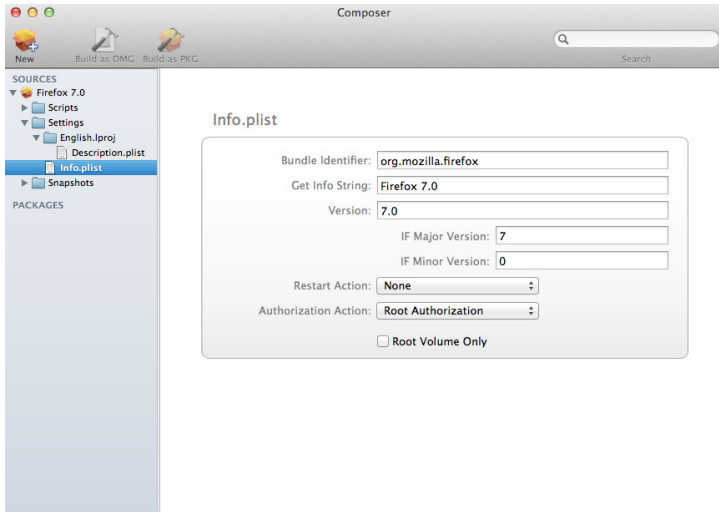
Editing Info.plist and Description.plist Files

Information property list (`info.plist`) files and description property list (`description.plist`) files are used by the Installer application to display information about a package and determine how it is installed. Composer allows you to edit the most commonly used information in these files.

This section explains how to edit these files.

Info.plist File

The `info.plist` file contains configuration information for a package. Composer allows you to define the `info.plist` keys and values shown in the screen shot below. After the screen shot, there is a list that further explains each key and value.



Bundle Identifier

Identifies the package type. For example, `com.jamfsoftware.composer`

Get Info String

Provides a description of the package. For example, `Composer 7.01 © 2009`

Version

Identifies the iteration. For example, `7.01`

IF Major Version

Identifies the major version number.

IF Minor Version

Identifies the minor version number.

Restart Action

Specifies reboot protocol for a package.

Authorization Action

Specifies authorization requirements.

Root Volume Only

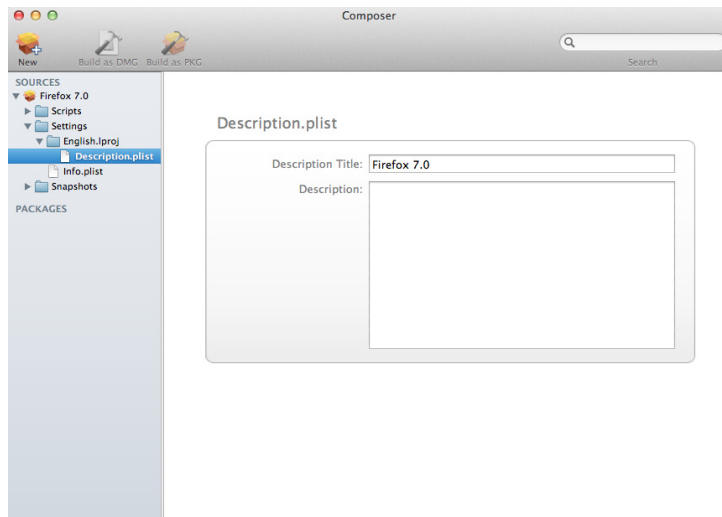
Indicates the package can only be installed to the root volume.

Less commonly used keys and values are also contained in the `info.plist` file. If you need to edit these items, Control-click (or right-click) **Info.plist** in the sidebar and select **Edit Manually**. This allows you to add or edit items in raw XML format.

Description.plist File

The `description.plist` file allows you to define how a package presents itself in the Installer application.

Each localization includes its own `description.plist` file that allows you to define a package's description title and description based on the target language.



There are other keys and values contained in the `description.plist` file. If you need to edit these items, Control-click (or right-click) **Description.plist** in the sidebar and select **Edit Manually**. This allows you to add or edit items in raw XML format.

Adding Localizations

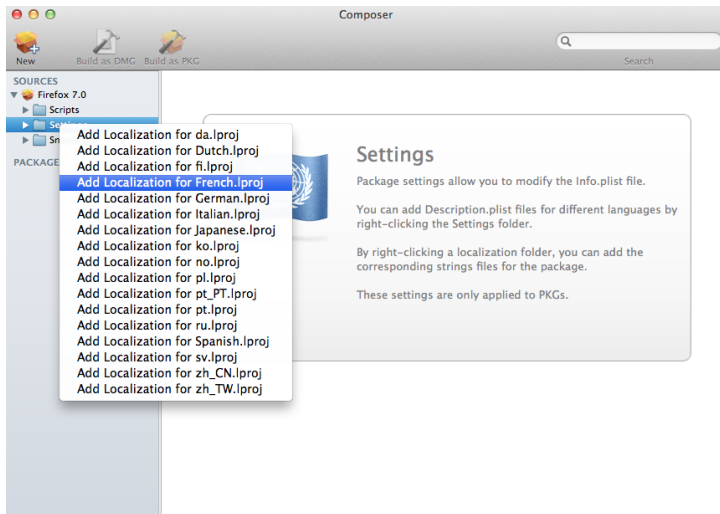
Localizations allow you to customize the language in which package information is displayed to a user. By default, a package source only includes an English localization.

Composer includes defaults for the following localizations supported by the PKG format:

- `da.lproj`
- `Dutch.lproj`
- `English.lproj`
- `Fi.lproj`
- `French.lproj`
- `German.lproj`
- `Italian.lproj`
- `Japanese.lproj`
- `ko.lproj`
- `no.lproj`
- `pl.lproj`
- `pt_PT.lproj`
- `pt.lproj`
- `ru.lproj`
- `Spanish.lproj`
- `sv.lproj`
- `zh_CN.lproj`
- `zh_TW.lproj`

To add a localization to a package source:

1. Click the disclosure triangle next to the package source in the sidebar.
2. Control-click (or right-click) **Settings** and choose the localization that you want to add.



Adding and Editing Files for a Localization

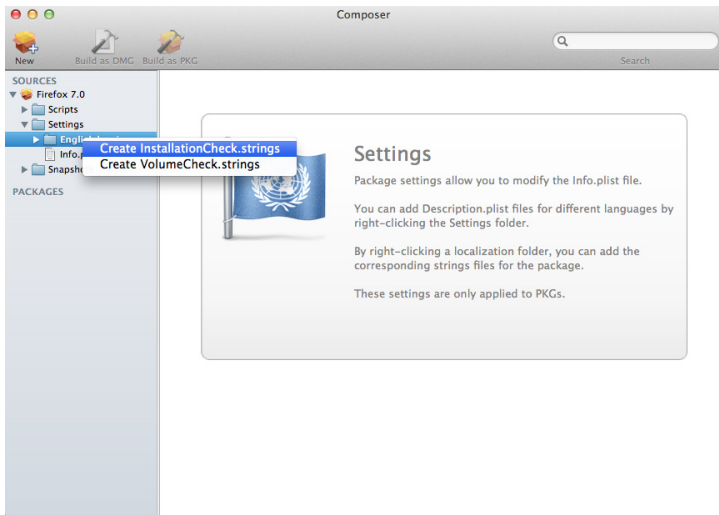
You can include two types of files in a localization:

- **Description.plist files**—These files display the title of a package and its description in the Installer application. Each localization contains a `description.plist` file by default. For instructions on how to edit these files, see “Editing Info.plist and Description.plist Files.”
- **Strings files**—`VolumeCheck.strings` and `InstallationCheck.strings` files are used to localize warning and error messages. These files are only effective when used in conjunction with their corresponding scripts (`VolumeCheck` and `InstallationCheck`). For instructions on how to add `VolumeCheck` and `InstallationCheck` scripts to a package source, see “Adding Scripts”.

To add `InstallationCheck.strings` or `VolumeCheck.strings`:

1. Click the disclosure triangle next to the package source in the sidebar.
2. Click the disclosure triangle next to **Settings**.

- Control-click (or right-click) the language folder you want to add the `.strings` file to, and select **Create InstallationCheck.strings** or **Create VolumeCheck.strings**.



- Click the `.strings` file to modify its contents in the Package Contents pane.

Building a Package from a Package Source

After you have verified the contents of a package source, Composer allows you to build two different types of packages: PKGs and DMGs. Each format has advantages depending on the intended use of the package and the tool you use to deploy it.

Once a package source exists in Composer, you can build a PKG or DMG package from the source at any time. You also have the ability to convert from one format to another after a package has been built. For more information about converting between the PKG and DMG formats, see “Creating a Package Source from an Existing Package.”

This section explains how to build PKGs and DMGs.

Building a PKG

PKGs can be deployed using almost any deployment tool, such as Apple Remote Desktop (ARD), the Casper Suite, and other client management systems.

The PKG format allows for easy installation by the user. Double-clicking the package file opens the Installer application and guides the user through the installation process.

Note: PKGs cannot dynamically deploy files in the user’s home directory to user templates when used with the Casper Suite.

By default, Composer builds flat PKGs. For more information on flat PKGs, see “Managing Composer Preferences”.

To build a PKG:

1. Select the package source you want to build as a PKG from the Sources list in the sidebar.
2. Click the **Build as PKG** button in the toolbar.

Note: If the Build flat PKGs preference is enabled and the package source contains scripts that are unsupported by flat PKGs, a dialog will appear. To disable this preference for this package only, click **Build as non-flat PKG**. To build a flat PKG that ignores unsupported scripts, click **Build as flat PKG**. For more information on which scripts are supported by flat PKGs, see “Adding Scripts”.

3. Select a location to save the package and click **Save**.

Building a DMG

When used in conjunction with the Casper Suite, the DMG format allows you to dynamically deploy files and folders to each user that has an account on a computer, as well as the network home directories of currently logged-in users. There is also an option to deploy files and folders to the user template directories, ensuring that any new user receives the correct default environment.

To build a DMG:

1. Select the package source you want to build as a DMG from the Sources list in the sidebar.
2. Click the **Build as DMG** button in the toolbar.
3. Select a location to save the package and click **Save**.

Building an OS Package

In addition to building deployable packages of applications and other files, Composer allows you to build DMGs of pre-configured operating systems. OS packages can save you time and enhance consistency across your network.

While building an OS package with Composer is similar to building one with the Disk Utility application, Composer allows you to clean up the OS by removing unnecessary files before building the DMG.

You can use Composer to manage the following cleanup options for an OS package:

Compress Disk Image

This option compresses the OS package DMG.

Delete Temp Files

This option ensures the files in `/private/tmp` are deleted before building an OS package. These files are usually deleted during the startup process.

Delete Virtual Memory Files

This option ensures that Virtual Memory files are deleted before building an OS package, including the potentially large `sleepfile`. These files are usually deleted and recreated during the startup process.

Delete Special Files

Apple recommends deleting the following files before building an OS package:

```
/private/var/db/BootCache.playlist  
/private/var/db/volinfo.database
```

This option ensures that these files are deleted.

Delete Caches

This option removes files in the `/Library/Caches` directory before building an OS package.

Remove Kerberos Certificate

This option removes existing Kerberos certificates before building an OS package, preventing the “This computer already exists” error when attempting to bind a computer securely to Open Directory.

Ensure Trashes are Empty

This option empties the Trash for any user with items in the `~/Trash` folder. It also updates a user’s `com.apple.dock.plist` file to reflect that the Trash is empty.

Configuring the OS

Before building your OS package, consider performing the following tasks to ensure the OS is completely configured to your environment:

- Install a clean copy of Mac OS X.
- Create the main admin account.
- For security purposes, create a secondary admin account to be used with Secure Shell (SSH, or remote login in Mac OS X).
- Activate SSH.
- Secure SSH by allowing only a single user or group access.
- Perform any other system security fortification.
- Configure miscellaneous settings, such as
 - Energy Saver settings
 - Keyboard and mouse settings
 - Network settings
 - QuickTime settings
 - Sharing settings
 - Login Window settings
 - Auto-login settings
 - Name and password or list of users
- Run all available software updates.
- Turn off the Software Update schedule.
- Confirm Universal Access settings.
- Confirm Directory Access settings.
- LDAPv3 bindings can often be built into your image.
- Active Directory bindings should not be built into the image. Each computer must join the domain.
- Make sure the Trash is empty.

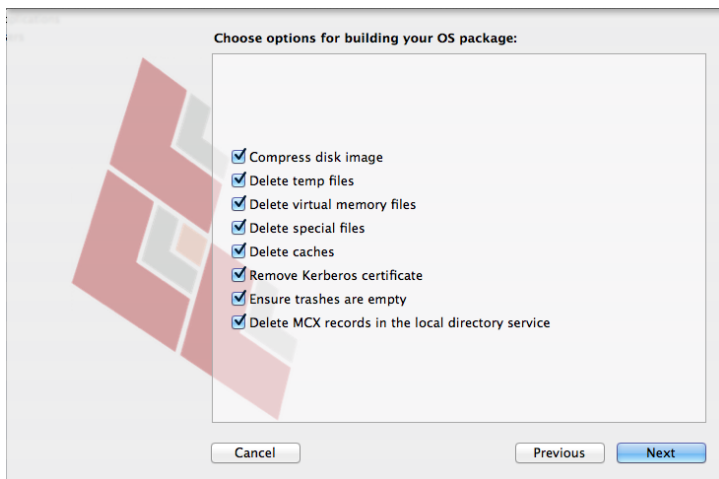
Packaging the OS

When you're finished configuring the OS, boot to another Mac OS X volume to build the DMG.

To build an OS package:

1. Open Composer and authenticate locally.
2. Click the **New** button in the toolbar.
3. Under the Operating System heading in the sidebar, select **Build OS Package**.
4. Select the disk you want to package and click **Next**.

5. Choose options for removing unnecessary files from the package, and then click **Next**.



6. Enter a package name and select a location to save the package, and then click **Build**.

Managing Composer Preferences

Composer lets you manage the following settings:

- Toolbar preferences
- Package preferences
- Cleanup options for OS packages
- Excluded files
- Location of the work directory
- Default bundle identifier

You can access Composer preferences by choosing “Preferences” from the Composer menu.

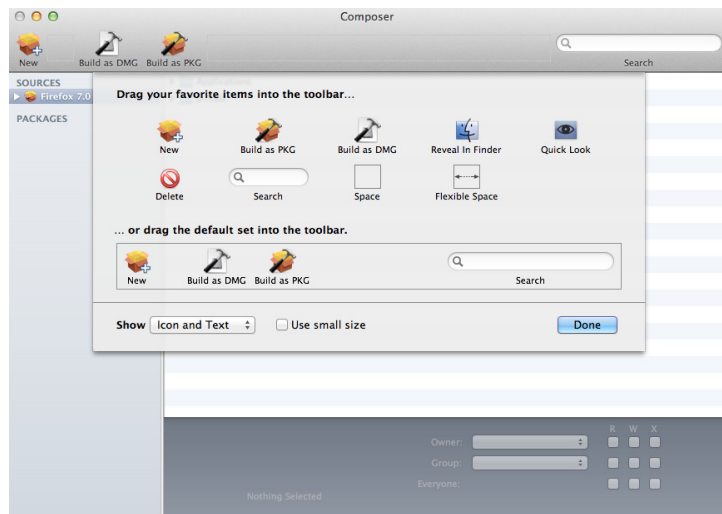
The information in this section provides a detailed explanation of Composer preferences.

Toolbar Preferences

Composer allows you to customize the toolbar by adding and removing items.

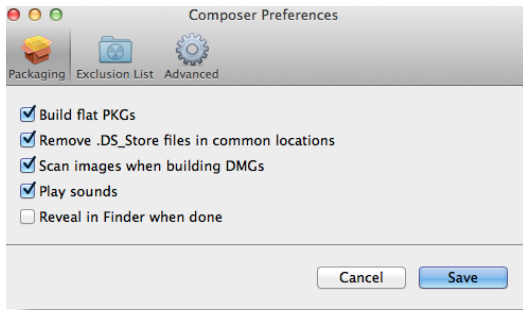
To add items to Composer’s toolbar, Control-click (or right-click) the toolbar and select **Customize toolbar**. Then drag desired items to the toolbar.

To remove an item from Composer’s toolbar, simply drag the item off of the toolbar.



Package Preferences

Composer allows you to manage Package preferences from the pane in the screen shot below.



This pane includes the following preference settings:

Build flat PKGs

By default, Composer builds flat PKGs. Flat PKGs consist of a single file and allow for easier and more reliable deployment than non-flat PKGs. You cannot view or modify the contents of a flat PKG after it is built.

Remove .DS_Store Files in Common Locations

Enabling this option ensures the removal of any files that disturb the way Finder windows are presented on a user's computer. Any .DS_Store files necessary to configure views of deployed files and folders will not be removed.

This feature removes .DS_Store files in the following locations:

```
/.DS_Store
/Applications/.DS_Store
/Applications/Utilities/.DS_Store
/Developer/.DS_Store
/Library/.DS_Store
/System/.DS_Store
/Users/.DS_Store
/Users/<username>/.DS_Store
/Users/<username>/<first_level_directory>/.DS_Store
```

Scan Images When Building DMGs

Scanning images when building a DMG calculates the checksum of the DMG and stores it in the disk image file.

The checksum is used to ensure proper installation of the DMG package.

Play Sounds

Composer plays a sound each time a package source is created or deleted.

Reveal in Finder when done

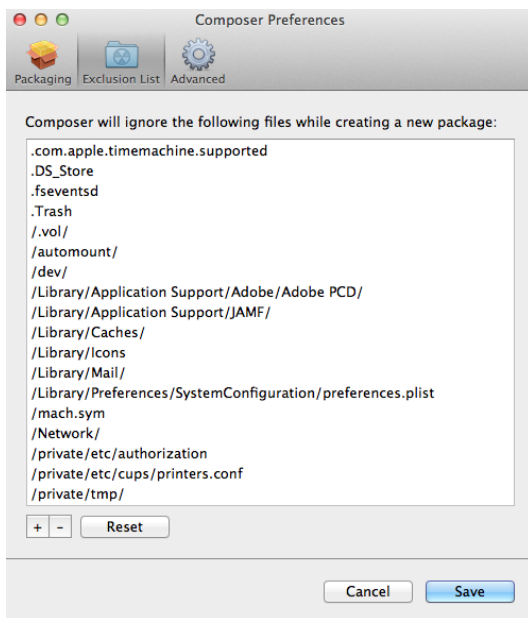
When this option is enabled, Composer reveals newly built packages in a Finder window.

Exclusion List

The exclusion list allows you to specify files and folders that should be ignored when creating a package using a snapshot or file system monitoring.

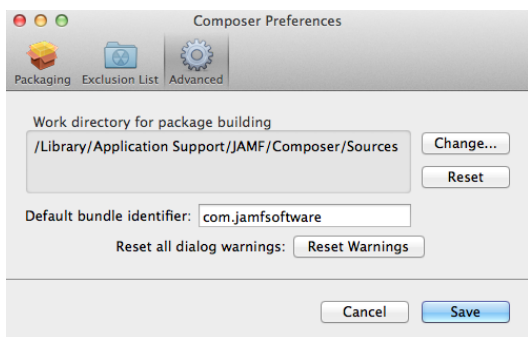
To view the exclusion list, click the **Exclusion List** button in the toolbar. A list of common files and folders is provided by default.

To add and remove files, use the **Add (+)** and **Delete (-)** buttons at the bottom of the list.



Advanced Preferences

Composer allows you to manage some advanced preferences from the pane in the screen shot below.



This pane includes the following preference settings:

Work Directory

When Composer creates a package source, files are copied from the hard drive to a work directory. This work directory must reside on a volume that has permissions enabled.

To change this directory, click the **Change** button, or hold down the Option key when you open Composer.

Default Bundle Identifier

The default bundle identifier is used when creating the `info.plist` file for a new package source. For example, if the default bundle identifier is `com.jamfsoftware`, and a package source named `Composer` is created, the bundle identifier for the package source is `com.jamfsoftware.composer`.

Glossary

description.plist file The editable file used to display the title of a package and its description in Apple's Installer application.

DMG Composer's packaging format that allows you to dynamically deploy files and folders to each user that has an account on a computer, as well as the network home directories of currently logged-in users.

exclusion list The editable list of files that should not be included in a package.

file system monitoring The method of package source creation in which Composer monitors any changes made to the file system during the installation process.

info.plist file The editable file that contains configuration information for a package, such as its bundle identifier, string information, version number, etc.

localization The language in which a package displays information to the end user.

package A deployable file or group of files.

package manifests The default files in Composer that determine which pre-existing files on a computer can be built into a package.

package source The stage at which a package can be modified in Composer. Package sources are listed under Composer's Sources list.

PKG Composer's packaging format that can be deployed using Apple Remote Desktop, the Casper Suite, and other client management systems.

snapshots Composer's method of recording files that exist on a boot drive.

strings files `InstallationCheck.strings` and `VolumeCheck.strings` are files that can be added to a package to localize warning and error messages.